SYNTHETIC SCHLIEREN

MARK I – STROBE 4

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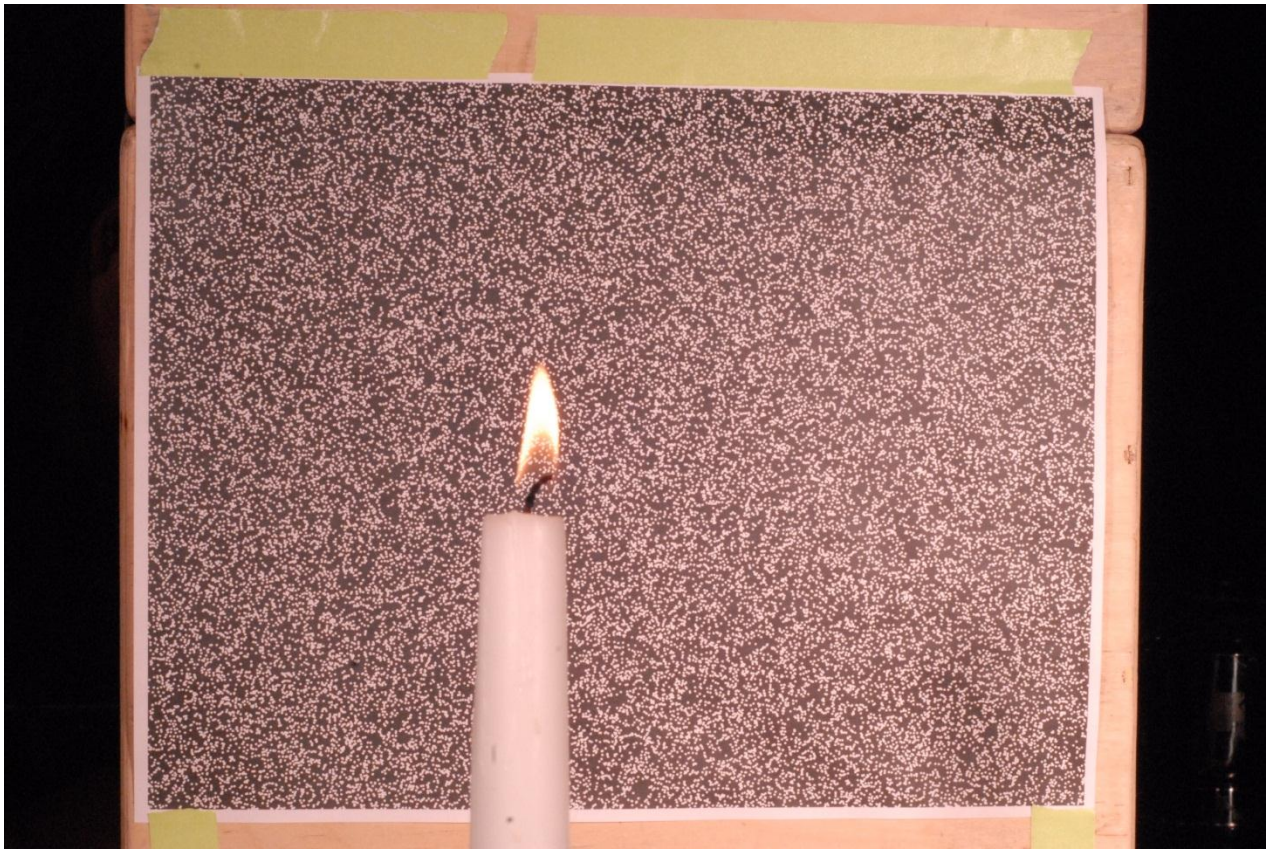
INTRODUCTION

Synthetic schlieren allows us to take this image,

ISO: 1250; A=f/18; shutter speed: 1/60

INTRODUCTION

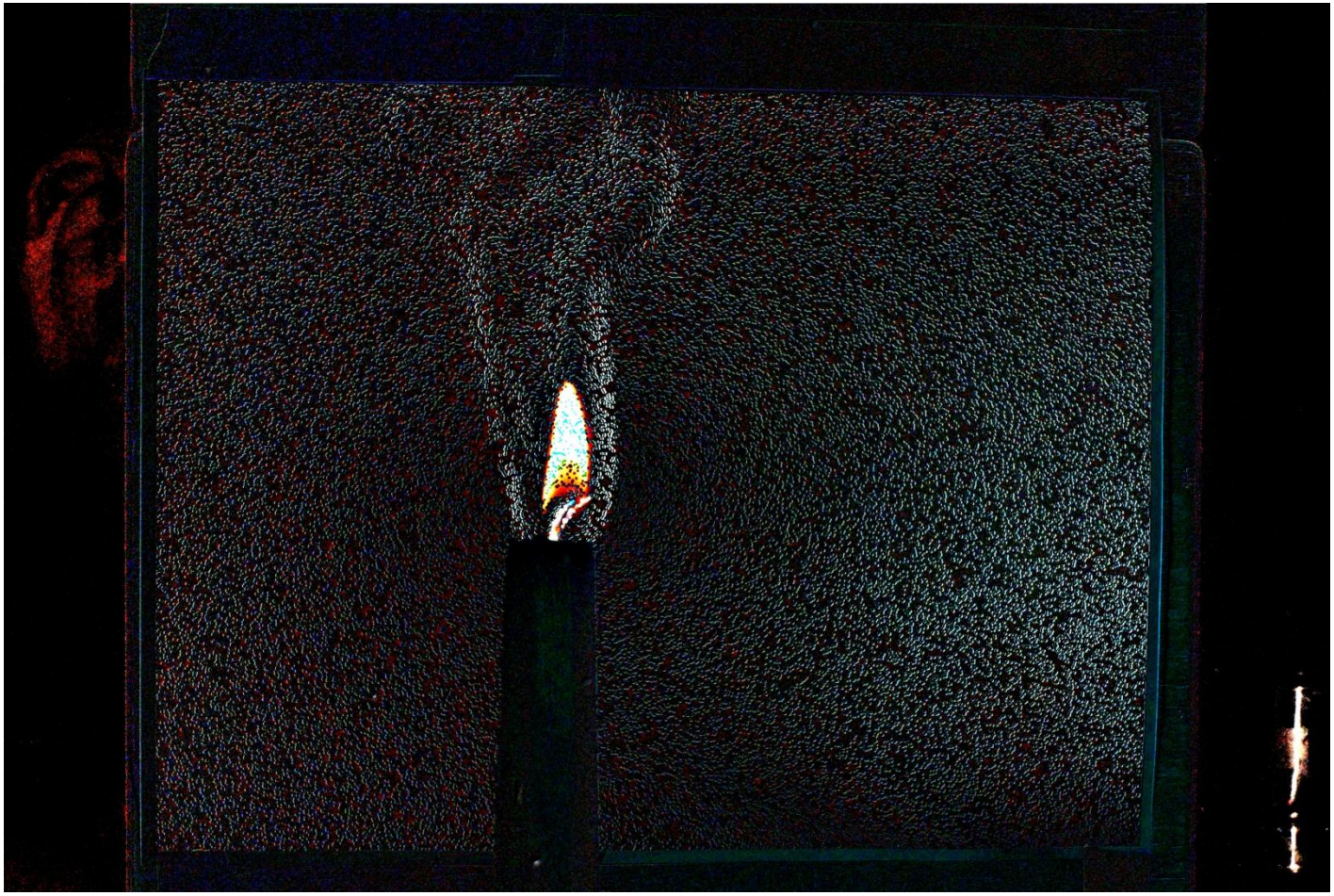
And this image,



ISO: 1250; A=f/18; shutter speed: 1/60

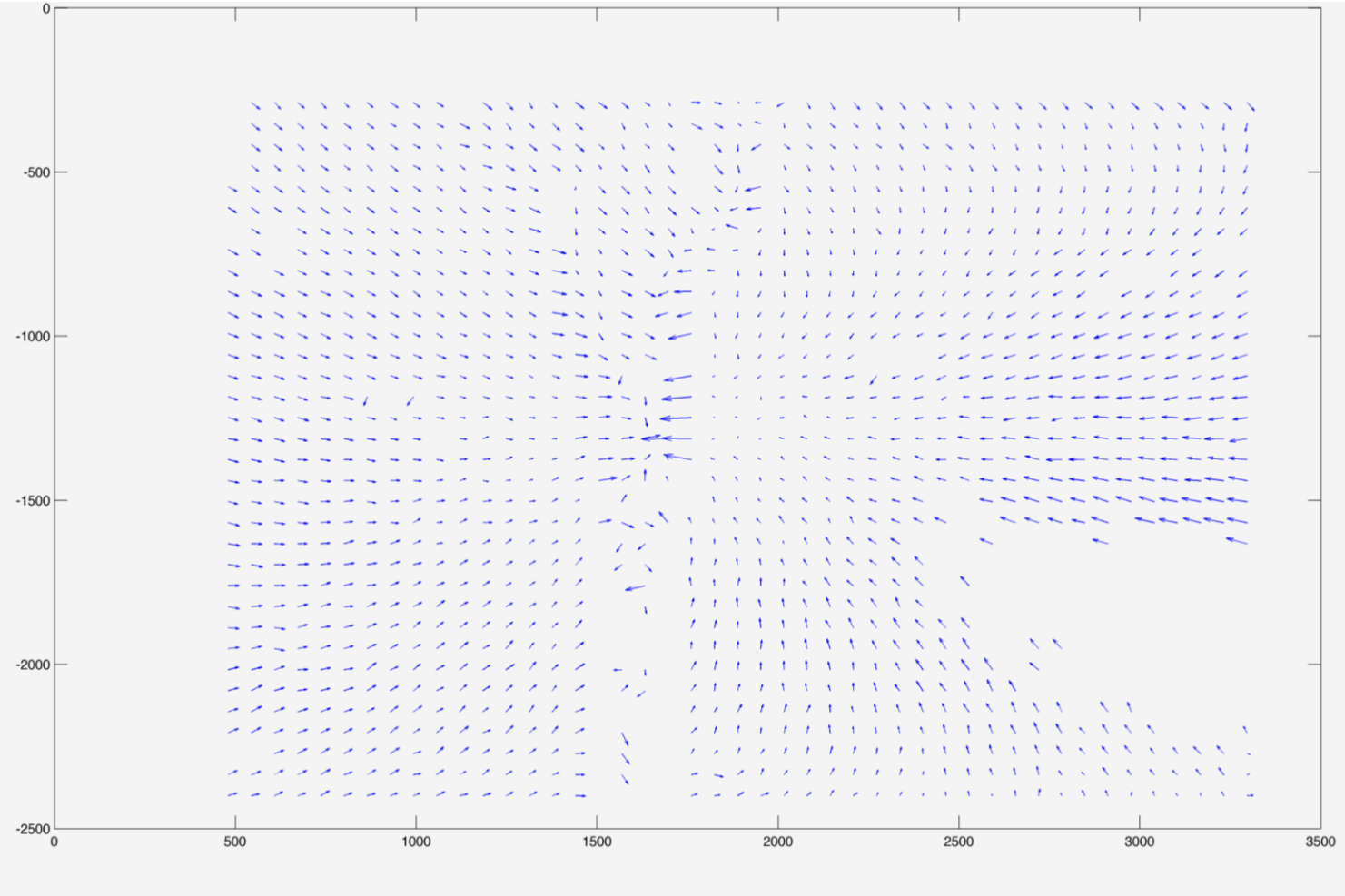
INTRODUCTION

And turn it into this.



INTRODUCTION

And also this.



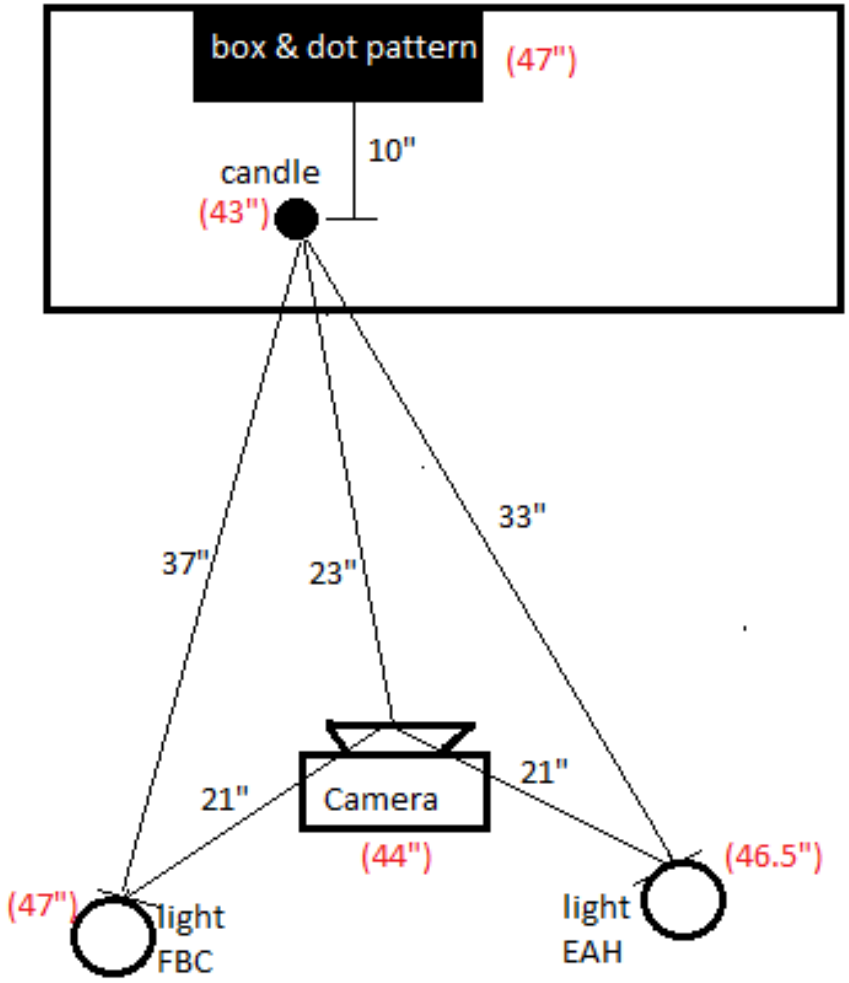
INTRODUCTION

- **Schlieren photography is a method of imaging fluid flows by using the relationship between the refractive index and the density of a fluid.**
- **However for traditional schlieren, the setup is relatively complicated. Synthetic schlieren has developed that makes the setup easier by using modern post-processing tools.**
- **Background Oriented Schlieren (BOS) involves a setup wherein a dot-pattern background is placed behind the fluid flow to be visualized.**

INTRODUCTION

- **We began looking to use a back-lit synthetic schlieren**
  - We learned that printing from MATLAB is extremely tricky
  - We used both paper and transparencies and found that using a transparency was much more difficult to light
- **Upon realizing that we weren't getting the images we would like, we decided to abandon the backlighting idea because we were getting good data lighting from the front**
- **We also decided to remotely trigger the shutter on the camera as to minimize the error that could come from the camera moving**

SETUP


box & dot pattern
(47")
10"
candle
(43")
37"
23"
33"
21"
Camera
21"
(44")
(47")
light
FBC
light
EAH
(46.5")

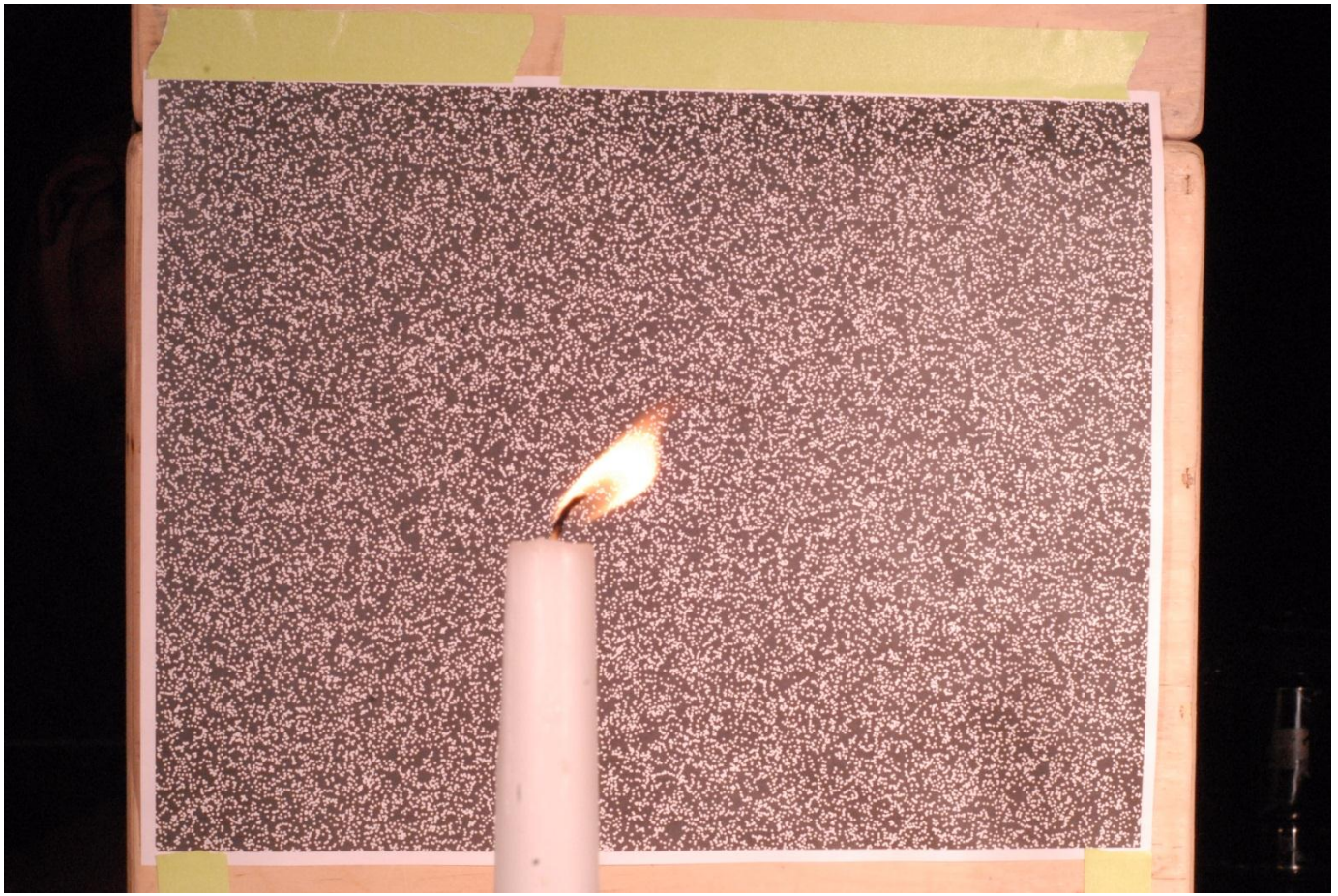
PROCEDURE

- **Set up dot pattern and subject such that subject is in the frame in order to make processing the image easier**
- **Set up the camera to shoot directly to a computer to avoid moving the camera**
- **Light dot pattern completely and adjust camera settings as necessary**
- **Take baseline photos where nothing is going on so that images can be compared later**
- **Light candle and begin capturing images**

RESULTS

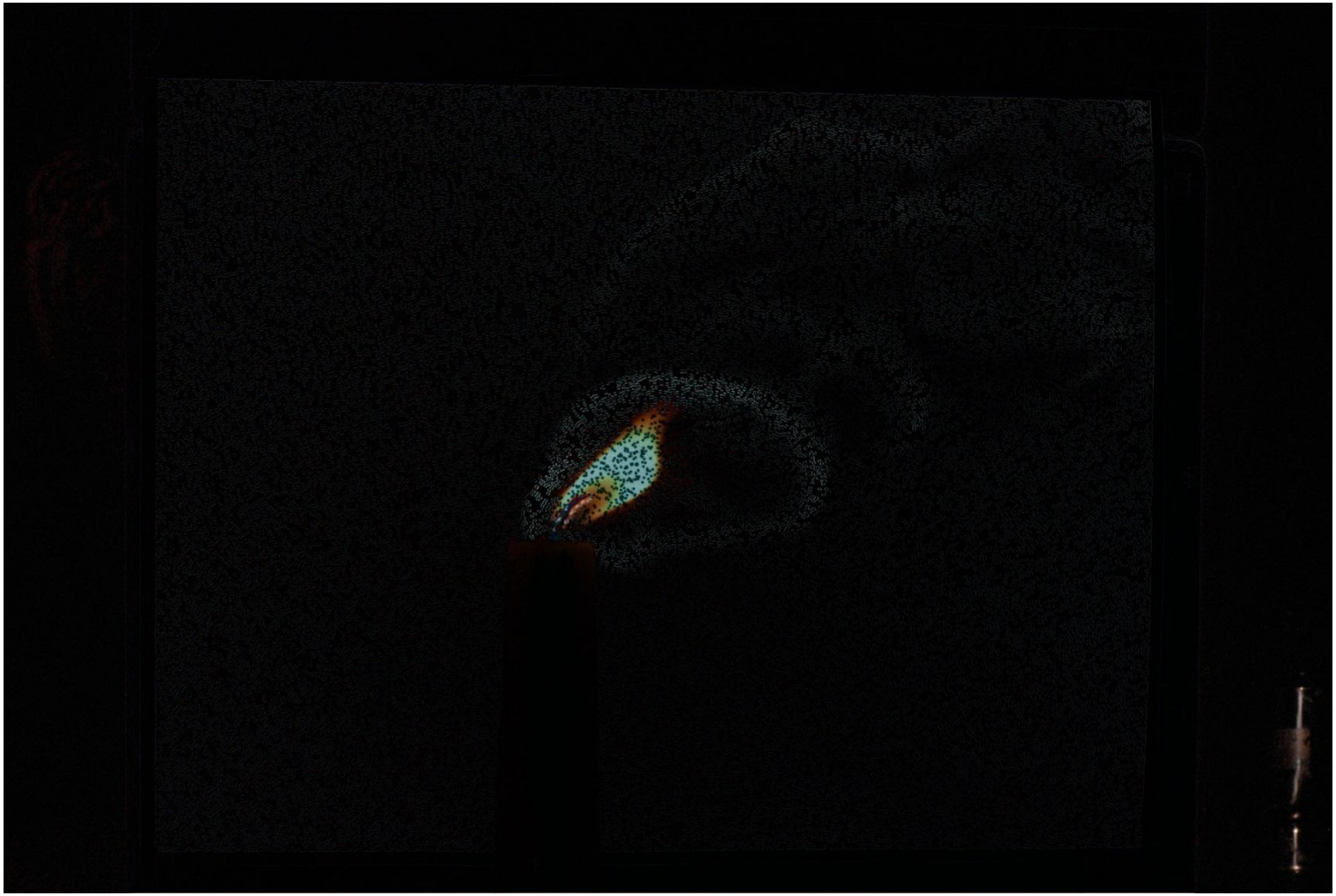
ISO: 1250; A=f/18; shutter speed: 1/60

RESULTS

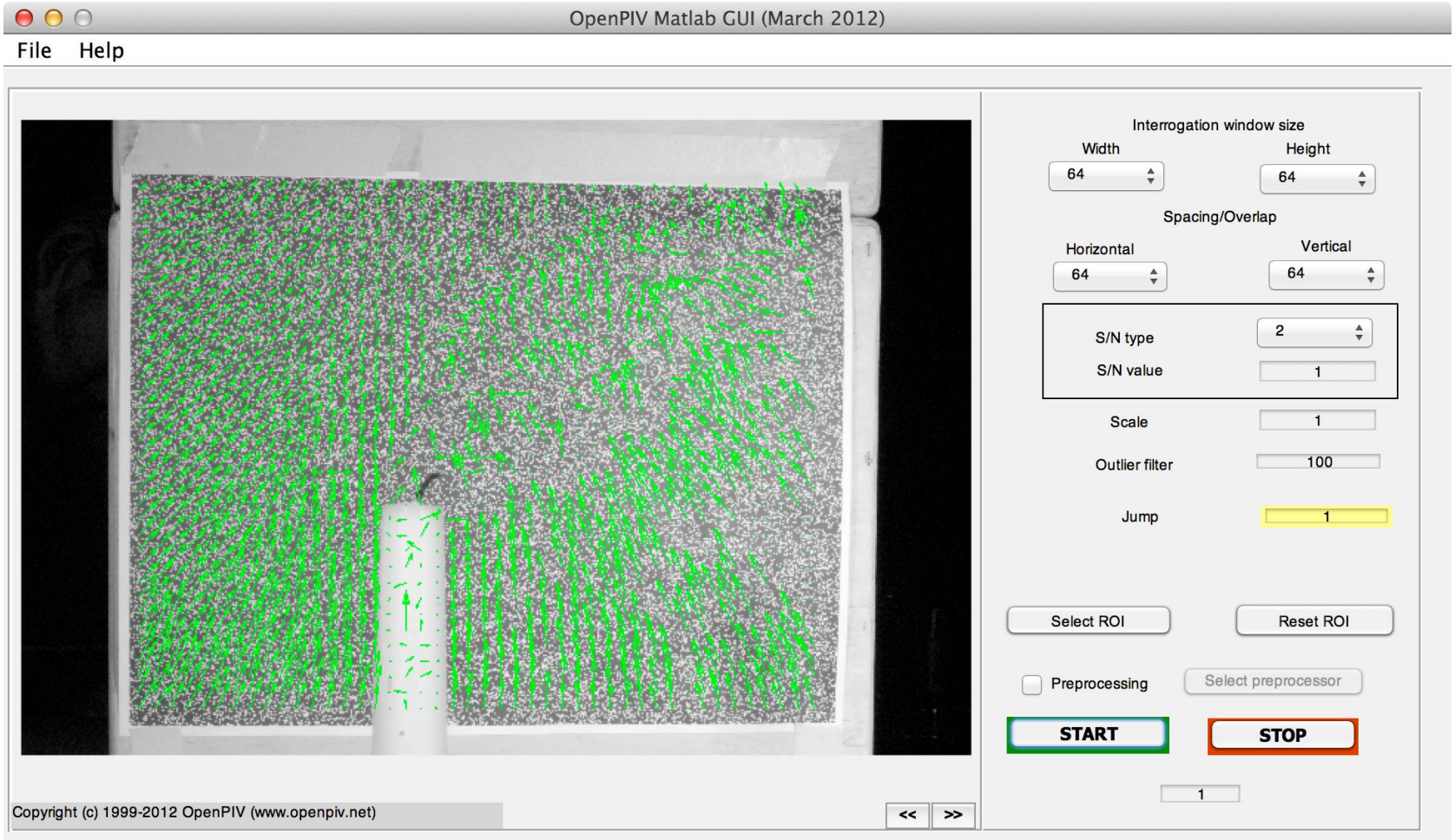


ISO: 1250; A=f/18; shutter speed: 1/60

RESULTS



ANALYSIS


OpenPIV Matlab GUI (March 2012)
File
Help
Interrogation window size
Width
Height
64
64
Spacing/Overlap
Horizontal
Vertical
64
64
S/N type
2
S/N value
1
Scale
1
Outlier filter
100
Jump
1
Select ROI
Reset ROI
Preprocessing
Select preprocessor
START
STOP
1
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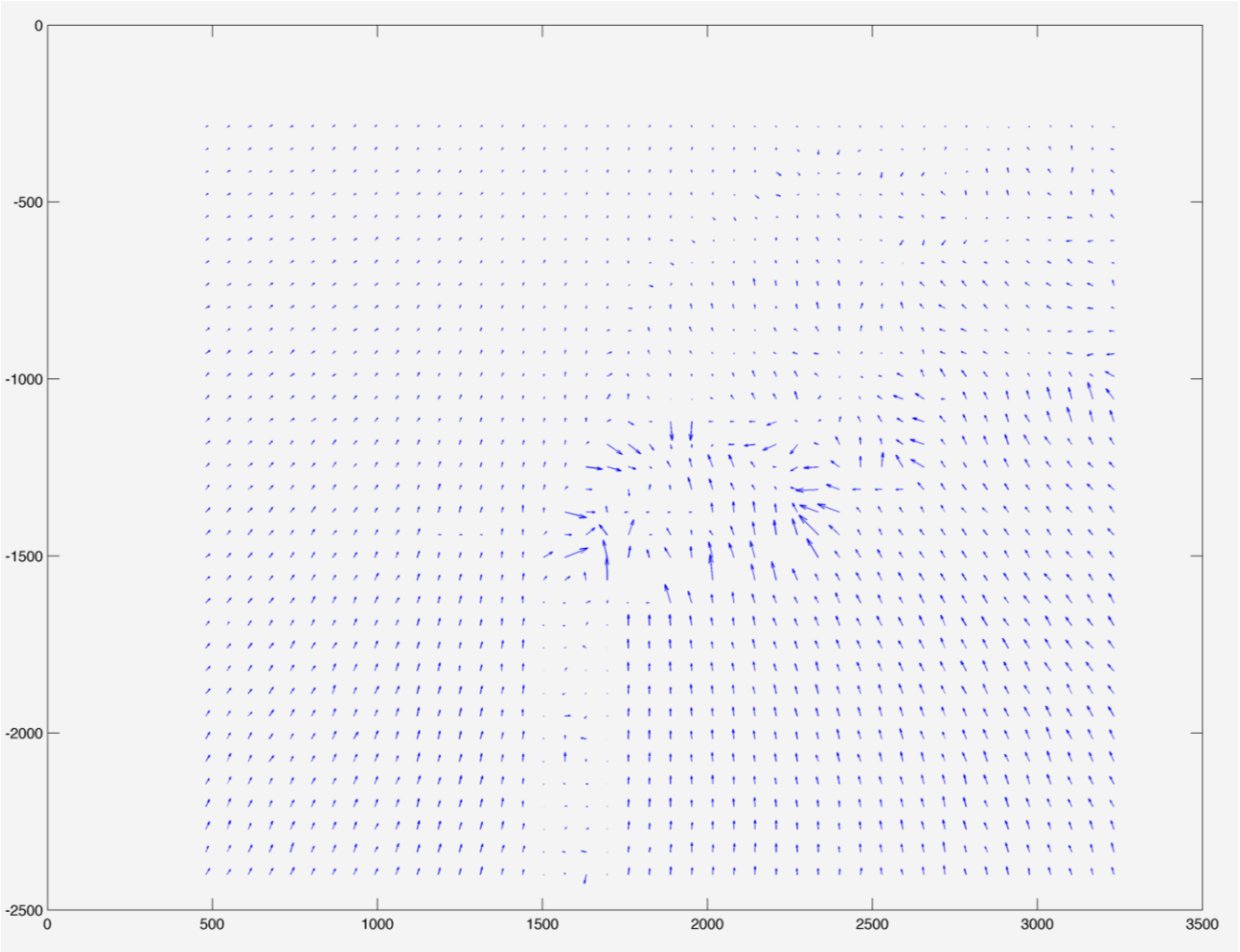
ANALYSIS



MOVING FORWARD

- **We will be continuing with our project.**
- **We want to figure out how to assess error so that we can predict which setups and subjects will work.**
- **We want to become more comfortable with MATLAB such that we can through processing come up with more interesting and useful outputs.**
- **We want to look at other fluid flows both with and without our dot pattern background so that we can test the effectiveness of synthetic schlieren at capturing flows we might not be able to see otherwise.**

ANY QUESTIONS?

THANK YOU.